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10/569,002	02/15/2006	Mitsuhiro Kashiwabara	112857518	1753

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K&L Gates LLP
P. O. BOX 1135
CHICAGO, IL 60690

EXAMINER	
HOLLWEG, THOMAS A	
ART UNIT	PAPER NUMBER
2879	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/569,002	KASHIWABARA, MITSUHIRO	
	Examiner	Art Unit	
	Thomas A. Hollweg	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11,12,14-18,20 and 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11,12,14-18,20 and 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 6, 2009, has been entered.

2. Claims 13 and 19 are canceled. Claims 20 and 21 are added. Claims 11, 12, 14-18, 20 and 21 are currently pending.

Claim Objections

3. The following claims are objected to because of informalities:

a. Claim 16, “the” is missing before “intermediate layer.”

b. Claim 20, "the blue light emitting light layer" lacks antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 11, 12, 14-18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., U.S. Patent Application Publication No. 2004/0032214

A1, in view of Yamazaki et al., U.S. Patent Application Publication No. 2004/0012331 A1.

6. **With regard to claim 11,** in figures 4B-D, Lee discloses an organic EL device comprising: a plurality of light emitting layers (44, 49, 50) including a red light emitting layer (50), a green light emitting layer (49), and a blue light emitting layer (44) laminated between an anode (41) and cathode (48); and an intermediate layer (45) comprised of an organic material provided in at least one location between the light emitting layers, said intermediate layer having an electron blocking property and a hole transporting property (44, 49, 50) [0031-0037], wherein the green light emitting layer has a hole transporting property and an electron transporting property.

7. Lee does not expressly disclose that the layers are in the order anode/red/green/blue/cathode.

8. Yamazaki, in figure 1A, teaches an organic EL device having a plurality of light emitting layers (12a-c) that may be selected to generate white light by doping polymer materials with pigments [0052-0063]. Therefore, the color order of the light emitting layers is independent from the cathode/anode arrangement.

9. Based on this teaching, one having ordinary skill in the art would understand that white light may be generated by the Lee device by selecting an appropriate material for each of the light emitting layers and then doping the layers to emit red, green and blue light. Therefore, the color order of the emission layers and the direction of emission are both matters of design choice.

10. At the time of invention, it would have been and obvious design choice for a person having ordinary skill in the art to construct the Lee organic EL device where the layers are arranged anode/red/green/blue/cathode, according to the teaching of Yamazaki, to produce excellent white light emission.

11. **With regard to claim 12,** in figures 4B-D, Lee discloses that a HOMO-LUMO energy gap of the intermediate layer (45) is greater than a HOMO-LUMO energy gap of at least one material constituting the light emitting layers (44, 49, 50) disposed adjacent to the intermediate layer (45) (energy gap property is inherent to the materials discloses) [0031-0037].

12. **With regard to claim 14,** in figures 4B-D, Lee discloses that the intermediate layer (45) is provided at least between the green light emitting layer (49) and the blue light emitting layer (44) [0031-0037], Further, in the combined Lee and Yamazaki device described in the rejection of claim 11, the intermediate layer would restrict the injection of electrons into the green light emitting layer and promote the injection of holes into the blue light emitting layer.

13. **With regard to claim 15,** in figures 4B-D, Lee discloses that a LUMO energy level of the intermediate layer (45) having a hole transporting property is higher than a LUMO energy level of an electron transporting component in the green light emitting layer (49) (properties inherent to the materials disclosed) [0031-0037].

14.

15. **With regard to claim 16,** in figures 4B-D, Lee discloses that the intermediate layer (45) is provided at least between the red light emitting layer (50) and the green

light emitting layer (49) [0031-0037]. Further, in the combined Lee and Yamazaki device described in the rejection of claim 11, the intermediate layer would restrict the injection of electrons into the red light emitting layer and promote the injection of holes into the green light emitting layer.

16. **With regard to claim 17,** in figures 4B-D, Lee discloses that the LUMO energy level of the intermediate layer (45) having an hole transporting property is higher than the LUMO energy level of an electron transporting component in the red light emitting layer (50) (properties inherent to the materials disclosed) [0031-0037].

17. **With regard to claim 18,** all of the limitations are disclosed by Lee and Yamazaki, as discussed in the rejection of claim 11 above, except for a color filter on the light take-out surface side of an organic EL device. Further, in the combined Lee and Yamazaki device described in the rejection of claim 11, the intermediate layer would restrict the injection of electrons into the green light emitting layer and promote the injection of holes into the blue light emitting layer.

18. Yamazaki teaches an organic EL device with a color filter on the light take-out surface side [0061].

19. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Lee and Yamazaki organic EL device, as discussed in the rejection of claim 11, where a color filter is disposed on the light take-out surface, as taught by Yamazaki, so that red, green and blue light may be selectively emitted from the organic EL device.

20. **With regard to claim 20,** in figures 4B-D, Lee discloses an organic EL device comprising: an anode (41); a hole transport layer (43) formed on the anode (41); a cathode (48); an electron transport layer (47) formed on the cathode (48); a plurality of light emitting layers including a first light emitting layer (44), a second light emitting layer (49), and a third light emitting layer (50) laminated in respective order between the hole transport layer (43) and the electron transport layer (47), such that the first light emitting layer (44) is formed in contact with the hole transport layer (43) and the third light emitting layer (50) is formed in contact with the electron transport layer (47); and an intermediate layer (45) comprised of an organic material provided between the third light emitting layer (50) and the second light emitting layer (49), said intermediate layer (45) having an electron blocking property and a hole transporting property, thereby restricting the injection of electrons into the second light emitting layer (49) and promoting the injection of holes into the third light emitting layer (50), wherein the first light emitting layer (44) is configured so that a portion of the holes injected through the hole transfer layer (43) are re-coupled in the first light emitting layer (44) to give a first light emission and a remainder of the holes are transported into the second light emitting layer (49), wherein the second light emitting layer (49) has a hole transporting property and an electron transporting property, such that some of the holes transferred from the first light emitting layer (44) are re-coupled in the second light emitting layer to give a second light emission and the remainder of the holes are transported into the third light emitting layer (50), and such that some of the electrons injected from the third

light emitting layer (50) contribute to a second light emission and the remainder of the electrons are transported to the first light emitting layer (44) [0031-0037].

21. Lee discloses that the second light emitting layer is green, but does not expressly disclose that the first light emitting layer is red and the third light emitting layer is blue. Put another way, Lee does not expressly disclose that the layers are in the order anode/red/green/blue/cathode.

22. Yamazaki, in figure 1A, teaches an organic EL device having a plurality of light emitting layers (12a-c) that may be selected to generate white light by doping polymer materials with pigments [0052-0063]. Therefore, the color order of the light emitting layers is independent from the cathode/anode arrangement.

23. Based on this teaching, one having ordinary skill in the art would understand that white light may be generated by the Lee device by selecting an appropriate material for each of the light emitting layers and then doping the layers to emit red, green and blue light. Therefore, the color order of the emission layers and the direction of emission are both matters of design choice.

24. At the time of invention, it would have been and obvious design choice for a person having ordinary skill in the art to construct the Lee organic EL device where the layers are arranged anode/red/green/blue/cathode, according to the teaching of Yamazaki, to produce excellent white light emission.

25. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee and Yamazaki, as applied to claims 11 and 16 above, in further view of D'Andrade et al., U.S. Patent Application Publication No. 2002/0197511 A1.

26. **With regard to claim 21,** all of the limitations are disclosed by Lee and Yamazaki, as discussed in the rejection of claims 11 and 16 above, except they do not expressly disclose that the organic material for the intermediate layer includes at least one of TPD and CBP. Lee discloses that appropriate materials for the intermediate layer include those with hole transport and electron blocking properties such as α-NPD [0033].

27. D'Andrade teaches that in addition to α-NPD, TPD and CBP are ideal materials with hole transport and electron blocking properties [0044].

28. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Lee and Yamazaki device described in the rejection of claim 16 above, where the organic material for the intermediate layer includes at least one of TPD and CBP, because these materials have hole transport and electron blocking properties, as taught by D'Andrade, and they would control the stream of electrons so that the device may emit excellent white light (Lee [0023]).

Response to Arguments

29. Applicants argue that the prior art reference Lee does not expressly disclose that the layers of the organic EL device are in the order "anode/red/green/blue/cathode," as claimed. The fact that this limitation is not expressly disclosed by Lee is acknowledged in the 35 U.S.C. § 103(a) rejection of at least claim 11. Lee in fact discloses the essential inventive feature of applicant's invention. This is the inclusion of an intermediate layer, which has a hole transporting property and an electron blocking property, between the electroluminescent layers of a red, green and blue stacked

organic electroluminescent device. The intermediate layer material (α-NPD) preferred by Lee is the same material preferred by applicant (see present figure 6) because it produces the benefits cited by applicant in applicant's argument. Specifically, it prevents excitons generated by one light emitting layer from being transferred into the other light emitting layers, thereby maintaining a good balance of luminous intensities.

30. The sole difference between applicant's claimed invention and the device disclosed by Lee is that applicant has chosen to reverse the color order of the organic EL layers relative to the anode and cathode.

31. Applicant further argues that the present specification describes specific reasons as to the importance of the color order of the light emitting layers. These include that specific examples of red light emitting materials (styrylarylene derivatives) which have a high hole transporting property, so there is a benefit of having the red light emitting layer in contact with the hole transporting layer. Also, that the blue light emitting layer is configured to minimize the movement of the energy into the red light and green light emitting layers, therefore it is preferable that the blue light emitting layer is provided on the cathode side.

32. While, arguendo, there may be a benefit if the preferred materials for the red light emitting layer are in contact with the hole transport layer, and there may be benefit if with a preferred configuration, the blue layer was on the cathode side, there is nothing in the claims regarding the materials for the red light emitting layer, or the configuration of the blue light emitting layer. Discussion in the specification regarding preferred embodiments does not limit the scope of the claims.

33. Lastly, applicant argues that the prior art reference Yamazaki is merely cited for the disclosure of utilizing red, green and blue light emitting layers to generate white light. Yamazaki is cited because it teaches an organic EL device having a red, green and blue organic EL layer between a cathode and an anode. Yamazaki further teaches that each of the light emitting layers (12a-c) may be made of the same material and that the color emitted is determined by a dopant (Yamazaki [0055]). Therefore, the color layers of Yamazaki may be arranged in any order, because each have the same materials and changing the color order of the light emitting layers will not change the electrical characteristics of the device.

34. One having skill in the art would understand that when the teachings of Yamazaki are combined with the device disclosed by Lee, the color order of the light emitting layers may be altered, because as in Yamazaki, the materials for the light emitting layers may be chosen so that a re-arrangement of color order will not affect the electrical characteristics of the device. The color order can be a design choice, and could be reversed or otherwise re-arranged depending on the nature of the light one wished to emit, so long as appropriate dopants were added to each light emitting layer.

35. As written, the claims describe a device which is identical to the Lee device except for or color order of the light emitting layers. Based on the teachings of Yamazaki, it would have been obvious to one having skill in the art that the color order could be reversed as long as the appropriate dopants were used in each layer. There are no limitations in the claims regarding specific materials, or other considerations, which specifically limits what types of materials and therefore, what colors must be

closest to the anode or to the cathode. Therefore, nothing in the claims distinguish them from the combined Lee and Yamazaki device where the structure of Lee, with the hole transporting intermediate layers, is rearranged according to the teachings of Yamazaki, so that the order of the layers is anode/red/green/blue/cathode, as claimed by applicant. For these reasons, applicant's arguments are not found to be persuasive.

Conclusion

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas A. Hollweg whose telephone number is (571) 270-1739. The examiner can normally be reached on Monday through Friday 7:30am-5:00pm E.S.T..

37. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

38. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TH/

/NIMESHKUMAR D. PATEL/
Supervisory Patent Examiner, Art Unit 2879